

## REMARKS

A Request for Continued Examination (RCE) is being filed contemporaneously herewith. Applicant requests reconsideration of the above-identified application in light of the amendments and remarks described herein. Claims 1-26 were pending in this application. Claims 1, 2, 7, 9, 11, 16, and 21 have been amended, and new Claim 42 has been added. Therefore, Claims 1-26 and 42 are now pending in this application.

Claims 1-26 have been rejected. Specifically, Claims 11-13 and 15-26 have been rejected under 35 U.S.C. § 102(b) and Claims 1-10 and 14 have been rejected under 35 U.S.C. § 103(a).

Applicant respectfully submits that all claims are now in condition for allowance. Accordingly, applicant requests reconsideration and allowance of all claims.

### Claim Rejections Under 35 U.S.C. § 102(b)

Claims 11-13 and 15-26 stand rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 6,013,572, issued to Hur et al. (hereinafter "Hur"). Applicant disagrees.

Anticipation requires the presence of each and every claim element in a single prior art reference. Hur fails to teach or even suggest each and every element of the claims at issue.

Claims 11, 16, and 21, as amended, generally recite a process of forming a solder alloy precursor on a microelectronic workpiece having a conductive under bump metallurgy including a first barrier layer and a seed layer, the process including forming one of a patterned mask and a second barrier layer on the exposed portions of the conductive under bump metallurgy, wherein the second barrier layer is a diffusion barrier layer, and forming the other of the patterned mask and the second barrier layer.

LAW OFFICES OF  
CHRISTENSEN O'CONNOR JOHNSON KINDNESS<sup>PLLC</sup>  
1420 Fifth Avenue  
Suite 2800  
Seattle, Washington 98101  
206.682.8100

Hur is generally directed to a method of fabricating tin silver solder bumps. Hur describes plating silver on the exposed portions of the underbump metallurgy (UBM), plating tin onto the silver and reflowing to form tin-silver alloy solder bumps.

Hur fails to teach or suggest forming a second barrier layer between the UBM underneath and the solder material, as recited in amended Claims 11, 16, and 21. In fact, the Office Action admits on page 4 that the first UBM layer taught by Hur is considered to be the barrier layer. In contrast, the claims at issue recite forming a second barrier layer (which is a diffusion barrier layer and is separate from a first barrier layer in the UBM) upon which the first lead-free solder layer is formed. For at least this reason, applicant submits that Hur fails to teach or suggest each and every element of the claims at issue. Accordingly, applicant respectfully requests withdrawal of the claim rejections of Claims 11-13 and 15-26 under 35 U.S.C. § 102(b).

Claim Rejections Under 35 U.S.C. § 103(a)

Claims 1-10 and 14 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Hur in view of U.S. Patent No. 5,773,359, issued to Mitchell et al. (hereinafter "Mitchell"). Applicant disagrees.

To establish a *prima facie* case of obviousness, the cited prior art references must teach or suggest all of the claim elements. In addition, there must be some apparent reason, either in the references or in the knowledge of one skilled in the art, to modify the reference or to combine the elements of multiple references with a reasonable expectation of success.

Claim 1, as amended, generally recites a process of forming a solder alloy precursor on a microelectronic workpiece that includes a patterned mask over a conductive under bump metallurgy including a first barrier layer and a seed layer, the process including forming a second barrier layer on the exposed portions of the conductive under bump metallurgy, wherein the second barrier layer is a diffusion barrier layer.

Mitchell is generally directed to an interconnect system including an interconnect bump over an underbump metallurgy and the method of fabricating the same. Mitchell describes an underbump metallurgy including three layers: a barrier layer 26 (e.g., titanium, tungsten, nickel, or chrome); an adhesion layer 28 (e.g., copper); and a mixture layer 27, which is a mixture of the metal of the barrier layer 26 and metal of the adhesion layer 28 (e.g., titanium copper) to serve as a transition layer between layers 26 and 28.

Mitchell also fails to teach or suggest forming a second barrier layer between the UBM underneath and the solder material, as recited in amended Claims 1, 11, 15, and 21. For at least this reason, applicant submits that Mitchell fails to cure the deficiencies of Hur. Accordingly, applicant respectfully requests withdrawal of the claim rejections of Claims 1-10 and 14 under 35 U.S.C. § 103(a).

Moreover, applicant has removed limitations that were added to Claim 1 in the previous amendment.

New Claim 42

Applicant has added new Claim 42. Applicant submits that new Claim 42 does not present any new subject matter and is also in condition for allowance.

///

///

///

///

///

LAW OFFICES OF  
CHRISTENSEN O'CONNOR JOHNSON KINDNESS<sup>PLLC</sup>  
1420 Fifth Avenue  
Suite 2800  
Seattle, Washington 98101  
206.682.8100

CONCLUSION

In view of the foregoing amendments and remarks, applicant respectfully submits that the present application is in condition for allowance. The Examiner is invited to contact the undersigned with any remaining questions or concerns.

Respectfully submitted,

CHRISTENSEN O'CONNOR  
JOHNSON KINDNESS<sup>PLLC</sup>



Emily C. Peyser  
Registration No. 59,844  
Direct Dial No. 206.695.1634

ECP:mgp

LAW OFFICES OF  
CHRISTENSEN O'CONNOR JOHNSON KINDNESS<sup>PLLC</sup>  
1420 Fifth Avenue  
Suite 2800  
Seattle, Washington 98101  
206.682.8100